REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the above amendments and in light of the following discussion, is respectfully requested.

Claims 64-67, 69-81, and 83-85 are pending in the application. Claims 68 and 82 are cancelled without prejudice or disclaimer. Claims 64-67, 69-73, 75, 78-81, and 84-85 are currently amended. No new matter is introduced.[1]

In the outstanding Office Action, Claims 64, 72, 73, 75, 76 and 77 were rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan (U.S. Patent No. 5,071,054) in view of Brown (U.S. Patent No. 6,417,477). Claims 65 and 67 were rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown, and further in view of Moro (U.S. Patent No. 6,602,561) and Ullmann (U.S. Patent No. 3,041,442). Claims 66 and 69 were rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown and further in view of Wilkins (U.S. Patent No. 6,532,656). Claims 68 and 71 were rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown and further in view of Saito (Japan Patent No. 9-19,829). Claim 70 was rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown and Wilkins and further in view of Magara (U.S. Patent No. 5,698,114). Claim 74 was rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown and Wilkins and further in view of Mannava (U.S. Patent No. 5,675,892). Claims 78 and 79 were rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown and Magara. Claim 80 was rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown, Magara, and Wilkins. Claim 81 was rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown, Magara, Wilkens, and Saito. Claim 82 was rejected under 35 U.S.C. § 103(a) as unpatentable over Dzugan in view of Brown, Magara, and Saito. Claim 83 was rejected under 35 U.S.C. § 103(a) as

[1] Amended Claims 64-67, 69-73, 75, 78-81, and 84-85 find support in the claims as previously presented and at least in Figures 4-5 and p. 20 , ln. 15 of the specification as originally filed, for examples.

unpatentable over Dzugan in view of Brown, Magara, Wilkins, and Mannava. Claim 84 was rejected under 35 U.S.C. § 103(a) as unpatentable over Futamura (U.S. Patent No. 5,951,884) in view of Sakai (Japan Patent No. 63-7234). Claim 85 was rejected under U.S.C. § 103(a) over Ishiwata (Japan Patent No. 8-290,332) in view of Futamura and Sakai.

Applicants acknowledge with appreciation the courtesy of Examiner Evans in conducting a personal interview with Applicants' representatives on September 11, 2008. The substance of the interview is summarized hereinafter. During the interview, the issues in the outstanding Office Action were discussed. In particular, the features of amended independent Claim 64 and the combination of the Dzugan, Brown, and Saito references were considered. Examiner Evans indicated that Applicants' arguments relating to the step of *densifying the porous deposition* deserved consideration. With regards to amended independent Claim 84, Examiner Evans suggested reciting a *deposition electrode* and a *melting electrode* to differentiate from the cited art. Based on this discussion, Examiner Evans indicated he would reevaluate the rejection of amended independent Claims 64 and 84 following the filing of a response to the outstanding Office Action.

With respect to Paragraph 2 of the Office Action, the Applicants note that all of the cited references noted above are 35 U.S.C. § 102(b) type references. Accordingly, the provisions of 35 U.S.C. § 103(c) regarding common ownership do not presently apply.

duty to particularly point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made is inapplicable.

It is respectfully requested that the rejection of Claim 64 as being unpatentable over Dzugan in view of Brown be withdrawn.

Amended independent Claim 64 recites a method for production of a finished component of a machine from an original component having a defect. The method includes removing a portion defining the defect to form a recess portion. Amended Claim 64 further

recites depositing a porous deposition via electric spark discharge from a first electrode on the recess portion. Amended Claim 64 also recites *densifying the porous deposition* by via electric spark discharge from a second electrode to form a *high-density thin film.*

Applicants recognize in the Specification as originally filed, that forming a high-density thin film creates a boundary part between a hard thin film and a deposition.[2] This boundary part allows the composition ratios of the deposition and hard thin film to grade. Hence, the hard thin film and the deposition can be firmly combined.[3] Furthermore, the Specification as originally filed notes, for example,

> "[T]he surface side of the porous deposition 47 is melted to form the high-density thin film 47a at the surface side of the deposition 47, air permeability of the surface side and a rear side of the deposition 47 is made to be lost so that oxidation resistance of the turbine rotor blade 1 after repair can be increased."[4]

Thus the applicants note that the steps of depositing a porous deposition and then densifying, at least has the benefits of increasing oxidation resistance and enhancing the adherence between the porous deposition and subsequently applied layers.

Turning to the applied references, Dzugan illustrates a process for preparing a cast superalloy article from a non-castable superalloy that exhibits unacceptably large casting defects.[5] Figure 3 of Dzugan illustrates that article 20 has primary defect 34 which is excised along with a portion of metal 40.[6] Dzugan states that the excision of primary defect 34 can be accomplished by grinding or chemical milling.[7] Dzugan further illustrates in Figure 4 that the volume previously occupied by the removed portion of metal 40 is filled with a filler metal 42 via welding.[8] However, Dzugan does not disclose or suggest depositing a porous deposition via electric spark discharge from a first electrode in an electric spark machine.

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[2] See, the Specification as originally filed at p. 12, lns. 4-12.
[3] Id.
[4] See, the Specification as originally filed at p. 12, lns. 13-21.
[5] See, Dzugan at col. 5, lns. 54-56.
[6] See, Dzugan at col. 6, lns. 42-59.
[7] See, Dzugan at col. 6, lns. 65-68
[8] See, Dzugan at col. 7, lns. 1-14.

Furthermore, Dzugan is silent to using a second electrode in an electric spark machine to *densify the porous deposition to form a high-density thin film.* Accordingly, Dzugan does not suggest or disclose all the of the features of amended independent Claim 64.

Brown fails to cure the deficiencies of Dzugan. Brown illustrates in Figure 1 an electrospark alloying system 20 for transferring material from the electrode 21 to the substrate/base material 22.[9] The electrode 21 and the base material 22 are conductive such that when a surge of energy is applied to the electrode, a spark is generated between the two components.[10] The spark functions to melt a portion of the electrode 21 and transfer a weld deposit to the surface of the substrate 22.[11] Brown further states that the weld deposits can be utilized to repair defects and fill holes.[12] However, Brown does not suggest or disclose *densifying the porous deposition* with a second electrode to form a high-density thin film. Brown discloses a process where deposits are made via electrospark alloying. Merely depositing material is a different operation from using a second electrode to *densify a previously applied deposition.* Accordingly, Brown fails to suggest or disclose all the features of amended independent Claim 64.

Saito further fails to cure the deficiencies of Dzugan and Brown. The abstract of Saito illustrates a process of forming a layer of metal carbide on a surface of a work to be processed 1. Saito illustrates an electric discharge machine with an electrode material Ti that is put afloat in a processing fluid 3 including carbon.[13] During electric discharge Carbide of Ti is formed by *chemical reaction* between the decomposed carbon and Ti in the fluid and on the surface of the work 1, and a hard film (of Ti-carbide) is formed on the surface of the work 1.[14] However, Saito does not suggest or disclose *densifying the porous deposition* with a

[9] See Brown, at col. 3, lns. 20-23.
[10] See Brown, at col. 3, lns. 41-44.
[11] See Brown, at col. 3, lns. 44-46.
[12] See Brown, at col. 9, lns. 60-64.
[13] See, Saito, the abstract.
[14] Id.

second electrode to form a *high-density thin film*. Saito discloses a method of creating a *hard film* (of Ti-carbide) via a chemical reaction during electric spark discharge between a processing fluid and the workpiece. Amended Claim 64 does not similarly require a processing fluid. Furthermore, a *high-density thin film* is not synonymous with a hard film. A material may be dense, yet soft. Conversely, a material may be porous, yet hard.

Accordingly, even the combined teachings of Dzugan, Brown, and Saito do not disclose or suggest all the features of amended independent Claim 64. It is submitted that amended independent Claim 64, and Claims 65-67 and 69-77 dependent therefrom, are in condition for allowance.

It is respectfully requested that the rejection of Claim 78 as being unpatentable over Dzugan in view of Brown and Magara be withdrawn.

Amended independent Claim 78 recites a method for production of a finished component of a machine from an original component having a defect. The method includes removing a portion defining the defect to form a recess portion. On the recess portion, a first electrode in the electric spark machine deposits an intermediary porous thin film via electric spark discharge. This intermediary porous thin film is *densified by a second electrode in the electric spark machine to form a intermediary high-density thin film*. Amended Claim 78 further recites depositing a porous deposition via electric spark discharge from the first electrode on the intermediary high-density thin film. Amended Claim 78 recites depositing a hard thin film via electric spark discharge from an electrode of Si on the porous deposition. The electric spark machine recited in Amended Claim 78 also includes a processing fluid including alkane hyrdrocarbons.

As discussed above, Dzugan and Brown fail to disclose or suggest densifying a porous deposition to form a high-density thin film. With respect to amended Claim 78, neither Dzugan nor Brown disclose or suggest *densifying an intermediary porous thin film*

with a second electrode to form an intermediary high-density thin film. Accordingly, the combined teachings of Dzugan and Brown do not disclose or suggest all of the features of amended independent Claim 78.

Magara fails to cure the deficiency in Dzugan and Brown. Magara illustrates an electric discharge machining method for forming a surface layer on a workpiece. In Magara particles of material are shown in an inter-electrode gap between the electrode and the workpiece.[15] Figure 3 of Magara illustrates a system including an electrode 4, a workpiece 5, a machining tank 7, and dielectric fluid 8 including silicon powder 9. Figure 4a of Magara illustrates electric discharge with a copper electrode and a machining fluid of kerosene.[16] Whereas, Figure 4b of Magara shows electric discharge with a copper electrode and a machining fluid of kerosene including silicon particles.[17] Figure 4b of Magara illustrates a smooth silicon cover film formed on the workpiece.[18] Magara also compares the embodiment shown in Figure 4b with a second embodiment utilizing a silicon electrode and kerosene.[19] However, Magara does not suggest or describe *densifying an intermediary porous thin film with a second electrode to form an intermediary high-density thin film.* The silicon cover film formed in Magara is a deposition, whereas in amended Claim 78 the second electrode is utilized to *densify the previously deposited* intermediary porous thin film.

Accordingly, even the combined teachings of Dzugan, Brown, and Magara do not disclose or suggest all the features of amended independent Claim 78. It is submitted that amended independent Claim 78, and Claims 79-83 dependent therefrom, are in condition for allowance.

It is respectfully requested that the rejection of Claim 84 as being unpatentable over Sakai in view of Futamura be withdrawn.

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[15] See, Margara at col. 2, lns. 44-49.
[16] See, Margara at col. 5, lns. 65-67.
[17] Id.
[18] See, Margara at col. 6, lns. 39-43.
[19] See, Margara at col. 6, lns. 48-52.

Amended independent Claim 84 recites an electric spark machine including a table configured to be controllably movable in any direction on a plane. The table includes a jig which supports a workpiece. Amended Claim 84 further recites a processing head configured to be controllably movable perpendicular to the table. The processing head includes a first holder to support a first *deposition electrode* and a second holder to support a *melting electrode*.[20] Amended Claim 84 also recites an electric power source to supply electricity to the processing head so as to generate electric spark discharge between the respective electrodes and the workpiece.

Turning to the applied references, figure 1 of Sakai illustrates an electric discharge machine with an electrode holder 34 attached to servo head 12. Figure 1 of Sakai further illustrates that dividing electrode 24 is attached to electrode holder 34 and an electric power source 24.[21] However, Sakai does not suggest or disclose a *first deposition electrode* and a *melting electrode*. Accordingly, Sakai fails to suggest or disclose all the features of amended independent Claim 84.

Futamura fails to cure the deficiency of Sakai. Futamura illustrates an apparatus for electric discharge machining which is movable horizontally in the XY direction. Futamura further illustrates that a workpiece 2 is secured on the table 1 via a mounting jig 14.[22] Figure 1 of Futamura illustrates electrode 11 fashioned to have surfaces corresponding to the side surfaces of workpiece 2.[23] However, Futamura does not suggest or disclose a *first deposition electrode* and a *melting electrode*. The shaped electrode of Furamura is not tantamount to having both a deposition electrode and a melting electrode.

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[20] The *melting electrode* is not limited to only melting but rather may be used for at least removal and finish machining. For example, see the Specification as originally filed at Par. 0044, 0049, and 0054.
[21] See, Sakai the abstract.
[22] See, Futamura at col. 3, lns. 28-30.
[23] See, Futamura at col. 3, lns. 43-45.

Accordingly, even the combined teachings of Sakai and Futamura do not suggest or disclose all the features of amended independent Claim 84. It is submitted that amended independent Claim 84 is in condition for allowance.

It is respectfully requested that the rejection of Claim 85 as being unpatentable over Ishiwata in view of Futamura and Sakai be withdrawn.

Amended independent Claim 85 recites an electric spark machine including a table with a jig for supporting a workpiece. Amended Claim 85 further recites a processing head configured to be controllably movable with respect to the table in the both vertical and horizontal directions. This processing head including a first holder to support a *first deposition electrode* and a second holder to support a *melting electrode*. Amended Claim 85 recites that he processing head is configured to detachably support the first holder and the second holder. Amended Claim 85 further recites a replacement unit configured to selectively attach any of a first holder and a second holder to the processing head and exchange the attached holder for the other holder. Furthermore, amended Claim 85 recites an electric power source to supply electricity to the processing head as to generate electric spark discharge between the workpiece and the respective first deposition electrode and the melting electrode.

As stated above, neither Futamura nor Sakai suggest or disclose a *first deposition electrode* and a *melting electrode*. Ishiwata fails to cure this deficiency. Ishiwata illustrates a small hole electric discharge machine 1 including an electrode holder provided at the upper end part of an electrode 11. [24] The electrode holder changed moutingly and demountingly by the chuck 23.[25] However, Ishiwata is silent with respect to a *first deposition electrode* and a *melting* electrode.

[24] See, Ishiwata the abstract.
[25] Id.

Accordingly, even the combined teachings of Ishiwata, Futamura, and Sakai do not suggest or disclose all the features of amended independent Claim 85. It is submitted that amended independent Claim 85 is in condition for allowance.

For the reasons discussed above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance for Claims 64-67, 69-81, and 83-85 are earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better condition for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

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